Individual learning on environmental vocational education and training courses does not always lead to the workplace application of knowledge and skills

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Empirical research on three commercial environmental vocational education and training (EVET) programmes revealed distinct personal, teaching and work-based presage factors which influenced individual learning and learning transfer to the workplace. The extent to which behaviour change and learning transfer occurred depended on a diverse range of factors, notably the: student's level of personal commitment and position within the employing organisation; relevance of the course content to the workplace; the organisation's environmental culture; and level of post-course managerial/supervisory support available within the workplace. Students responded more positively to courses which focussed on education *for* rather than *about* the environment and which had an associated high workplace utility.

Keywords: adult learner; course evaluation; environmental vocational education and training; individual learning; organisational learning.

Introduction

Organisations are increasingly behaving more sustainably due to a general growth in environmental awareness, an associated rise in the 'green economy' and the modern emphasis on polluter pays and producer responsibility focussed legislation (Adams 2006; Environment Agency 2010). Implementing sustainable development necessitates organisational change. Changes may be significant where processes, products and corporate policies need to be (re)developed (Siebenhüner and Arnold 2007). Continuing environmental vocational education and training (EVET) is essential to facilitate these changes as crucial decisions need to be made before current secondary and tertiary students enter the labour market. Organisations also vary in their requirements depending on their (perceived) environmental burden, level of commitment to its reduction and opportunities within the marketplace.

Previous research indicates that the individual learning which unpins organisational learning is influenced by a variety of presage factors (Biggs et al. 2001; Gijbels et al. 2005; Vermunt and Vermetten 2004). Teaching factors encompass the subject area, syllabus/examination board requirements, task complexity, methods of teaching and assessment and the learning climate. Personal factors include the student's intended learning outcomes; prior knowledge/experience, motivation for learning, preferred learning style(s) and preferred approach to learning. This research sought to examine how these and other course-related factors may influence the transfer of individual learning to the workplace.

Methodology

Scope

The research scope was restricted to three continuing EVET programmes offered by a UK-based commercial training organisation, Connaught Compliance Training Services (Connaught) (Table 1). Course syllabi were provided by external examination boards. Teaching materials and course assessments were written by representatives from Connaught and approved by the relevant examination board.

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Table 1. Course overview

Course Type	Duration (days)[1]	Target Audience	QCF Equivalent Level[2]
Foundation	4	Individuals who are new to environmental management and/or managers and supervisors of other disciplines who need to manage environmental issues	2
Management	4	Managers and supervisors of other disciplines who need to manage environmental issues	2
Advanced	10	Individuals who either are/intend to become, environmental practitioners	3

Notes: 1. Course duration was the minimum required by the examination board. 2. None of the courses had been credit rated by either Ofqual (England) or DCELLS (Wales). Qualifications and Credit Framework (QCF) equivalency levels are those quoted by the examination board.

All courses were 'open', *i.e.* delivered simultaneously to students from a range of organisations. Connaught initially offered only Advanced and Management Courses. Foundation Courses were added in response to the subsequent release of a new examination board syllabus and associated market demand.

Phases

The research was divided into two distinct phases:

- Phase 1: Pilot Study - Advanced and Management Courses.
- Phase 2: Additional Study – Advanced and Foundation Courses.

Phase 2 began following Connaught's introduction of the Foundation Course. Courses were only included with the prior permission of the participants, *i.e.* the tutor(s) and students.

Evaluation framework

The research methodology utilised a bipartite structure (Figure 1) to identify key aspects of the learning process. The framework was derived from the interrelationship between Biggs' 3P Model (Biggs et al. 2001) and Kirkpatrick's (1998) Four Levels Evaluation Model. The former provides a systematic, student-centred overview of the learning process. Each learning event is described in terms of its presage factors (inputs), process (operations) and products (learning outcomes). Biggs' model is not, however, specifically designed for use with vocational courses. Presage factors are sub-divided into situational (*i.e.* teaching) and personal (*i.e.* student). Consideration of pertinent work-based factors, as in Figure 1, extends the use of this model to vocational courses (Draper 2012).

Kirkpatrick's model is utilised primarily to determine whether a closed course addresses the requirements of the recipient organisation (Kirkpatrick 1998; MacKie 2007). Presage factors are implicit within this model, which places greater emphasis on the learning product. The first two levels focus on the effect of training on the individual, *i.e.* on his/her reaction to the course (Level 1) and associated changes in knowledge, skills and attitude (Level 2). Levels 2 and 3 ('behaviour') reflect that learning involves changes in skills, knowledge, attitudes or behaviour. Levels 3 and 4 ('results') pertain to the consequential changes within the individual's workplace. Previous research (Alliger et al. 1997; Draper 2012) indicates that increased understanding of course effectiveness is achieved by distinguishing between the student's:

- Affective and utility reaction (Level 1).

- Immediate and long(er) term learning (Level 3).

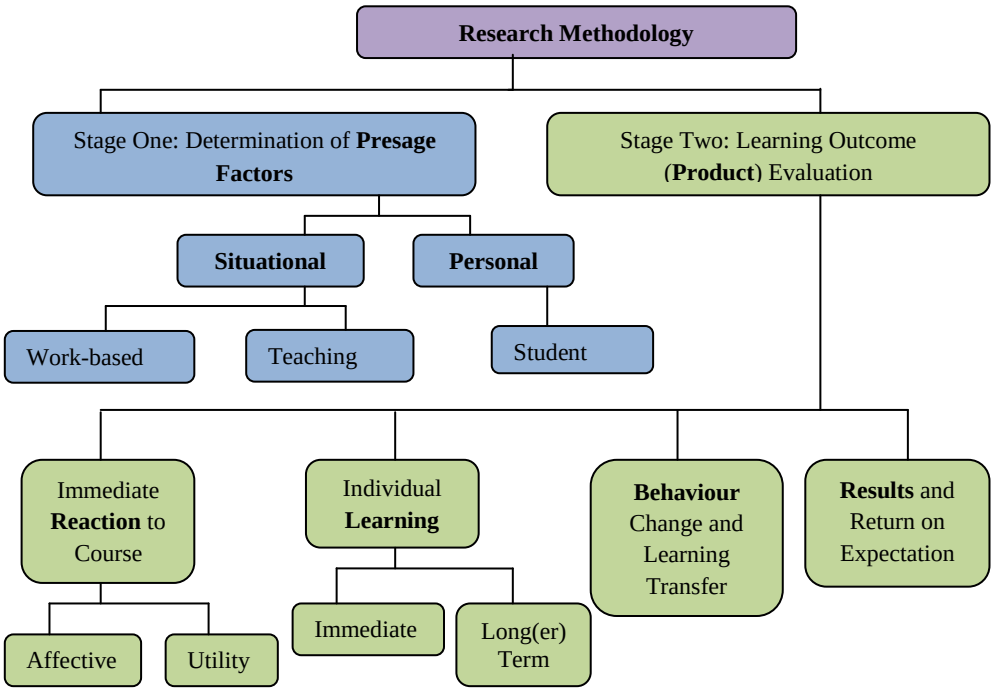


Figure 1. Research methodology overview

Document design and evaluation: Phase 1

Questionnaires were used to compile both quantitative and qualitative data. With the exception of Connaught's existing 'end-of-course feedback questionnaire', all questionnaires were bespoke. Five-point Likert scales were utilised for quantitative data collection. Qualitative data were obtained via questionnaires and one-to-one interviews. Distinct pre-course questionnaires and interview protocols were developed for students, tutors and sponsors. Documents were developed based on the results of an associated literature review and interviews with former students (n = 19) and sponsors (n = 10). Interviews were informal but utilised checklists containing five core questions for each participant type (Table 2).

Table 2. Core questions for preliminary student and sponsor interviews

Student questions	Sponsor questions	Common questions
Were you sent on this course, or did you volunteer?	Why did you send employees on an environmental course?	How do you think the course will/should be taught?
Why did you choose/were you sent on this specific course?	Why did you choose the specific course you selected?	What makes a good tutor and how can he/she make learning easy/easier?
How do you like to learn?	How did you choose which employees to send?	

Additional data was obtained from analysis of feedback received from students, course tutors, sponsors and Connaught's sales/marketing staff during the previous 12 months. Course syllabi, guidance for course providers and examination board audit reports were reviewed to identify pertinent recommendations and requirements. Post-course interviews were unique to each participant as they were designed to elicit additional information and clarification on his/her previous answers.

Data collection: Phase 1

Data was collected in two distinct stages. Stage 1 (Figure 2) focussed on the determination of pertinent presage factors; Stage 2 on the evaluation of learning outcomes/products. Tutors were asked to complete two pre-course questionnaires prior to teaching a participating course. The Influential Factors Questionnaire targeted his/her perception of those factors which support/inhibit course attendance and individual learning. The core focus of the items within the Learning and Teaching Styles Questionnaire was on deep and surface approaches to learning (Biggs et al 2001; Vermunt and Vermetten, 2004) and the individual's preferred mode(s) of learning and teaching, *i.e.* teacher-directed, self-directed or collaborative (Ramsden 2003).

Tutor-specific questionnaires were adapted to form their student counterparts. An additional Background Information Questionnaire focussed on the student's prior environmental experience, knowledge and training. Course-specific multiple-choice questionnaires were developed as an initial assessment of relevant student learning. These Pre-course Quizzes were used as an 'ice breaker' by the tutor at the start of the course.

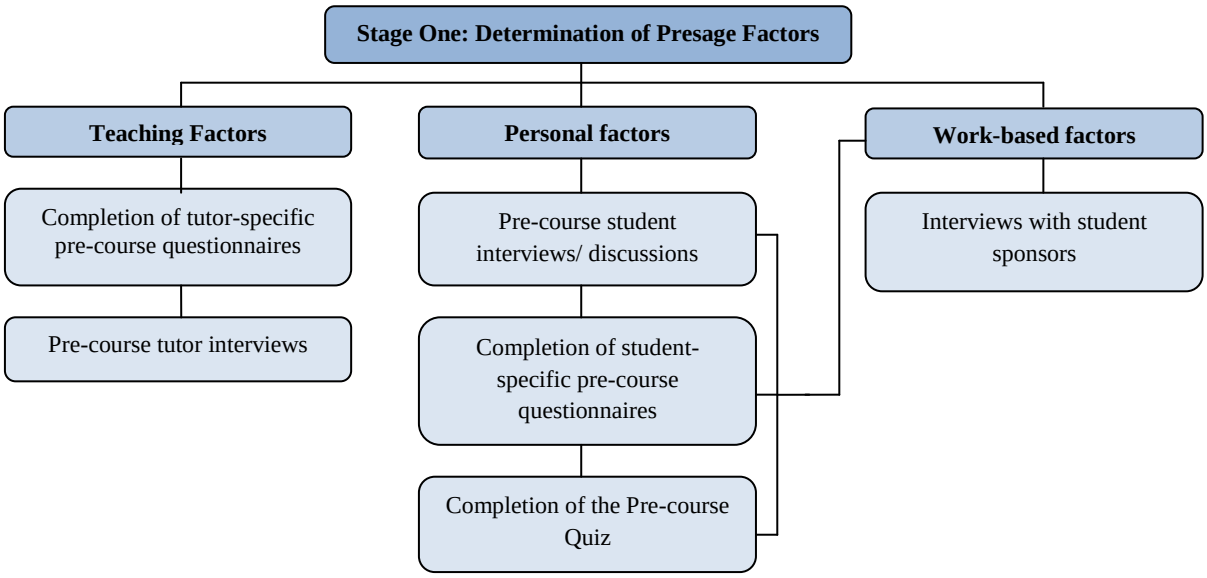


Figure 2. Stage 1: Determination of presage factors

Prior to the commencement of a course attended by their employee(s), sponsors were interviewed to facilitate:

- Identification of work-based factors which influence:
  - Student attendance and success.
  - Subsequent transfer of knowledge to the workplace.
- Post-course determination of the sponsor's return on expectation.

The interview protocol was derived from the checklist used for the preliminary identification of course specific factors. Additional questions focussed on the anticipated:

- Workplace support for the student during and following course attendance.
- Changes in the student's behaviour and additional workplace changes:
  - On his/her return to work.

- Within three months of course attendance.

Post-course interviews with students and sponsors were used in Stage 2 (Figure 3) to compare *inter alia* their respective anticipated and actual return on expectation.

Students were initially invited to formally evaluate the course arrangements, content and delivery via Connaught's 'end-of-course feedback questionnaire'. Additional data pertaining to the individual's affective reaction and associated perceived course utility were obtained using course-specific student and tutor feedback forms. Immediate changes in the student's level of knowledge were estimated by comparing the student's assessment results and his/her score in the Pre-course Quiz, previous experience/training and reaction to the course. Advanced and Management Courses included in Phase One had a shared workplace assignment but distinct examinations. The SOLO Taxonomy (Biggs and Collis 1982) (Table 3) was used to facilitate the qualitative examination of each course assessment and associated student responses.

Table 3. SOLO Taxonomy: Core criteria

Level	Criterion
1: Prestructural	No knowledge is apparent
2: Unistructural	Limited understanding of one aspect of the topic
3. Multistructural	Response presented as a list or description containing a number of unrelated ideas about a topic
4. Relational	Most significant aspects are related to each other and form a coherent whole
5. Extended abstract	All aspects are brought together. The student is able to theorise about alternative applications

Evaluation of the student's long(er) term retention of knowledge and subsequent behavioural changes was undertaken via bespoke post-course interviews. These were based *inter alia* on the results of an Action Plan. Prior to leaving the classroom, each student identified between two and five tasks/activities which he/she would undertake during the following three months, *i.e.* before receiving his/her course assessment results. Post-course interviews were scheduled for 12 – 15 weeks post-examination. The dual aim of the interview was to:

- Address any issues raised by the student's:
  - Results in the course assessment.
  - Responses to the research questionnaires.
  - Action Plan.
- Evaluate the student's perspective of his/her:
  - Changes in attitude/behaviour as a consequence of course attendance and associated learning transfer.
  - Return on expectation.

Final interviews were undertaken with sponsors and focussed on whether his/her anticipated return on expectation had been achieved. Interviews included specific consideration of the following issues:

- Individual behaviour change.
- Learning transfer and organisational learning.
- Organisational support for course attendees.

Document development and data collection: Phase 2
Completion of Phase 1 coincided with Connaught's introduction of the Foundation Course. Demand for the Management Course had been declining for two years and within six months of its introduction, the Foundation Course had completely replaced it.

Phase 2 sought to compare the Foundation Course with a revised version of the Advanced Course. The latter course had been updated following Phase 1 as an inherent part of the annual course review and revision cycle. The workplace assignment had been removed and a new two-part examination introduced. The research methodology and core documents for Advanced Courses remained unchanged between the two phases to facilitate subsequent comparisons between courses.

As the Foundation Course was new, participating tutors were asked to complete a simplified Combined Student Involvement and Influential Factors Questionnaire with no reference to previous courses. The remaining questionnaires and interview protocols were identical to those used in Phase 1. References to the 'Management Course' were replaced by 'Foundation Course'.

Results
Data evaluation
Data was analysed from a total of 78 students, 25 sponsors and six tutors (Table 4).

Table 4. Participant summary

Course		No. of participants		
Type	No.	Students	Sponsors	Tutors[1]
Management	2	12	3	2
Foundation	2	14	3	2
Advanced	8	52	19	6

Note 1. Tutors were allocated to individual courses based on availability. Three of the advanced courses had different tutors in each of the two weeks. Three tutors taught more than one course type. A total of six different tutors were used

Quantitative data was analysed using the variation ratio and Simpson's diversity index. The former provides a simple measure of statistical dispersion whereas the latter provides more information about the spread of data. All values range between 0 and 1 with those close to zero implying near unanimity.

Student characteristics
Attendees were typically male, aged 35 – 55 and employed in the private sector in a managerial/supervisory or advisory function (Table 5). None of the students had previously attended an external EVET course. The predominant use of vague descriptors, such as "*part of induction training*" (SC23), "*ongoing job training*" (SC23 and SC56) or "*for ISO 14001*" (SC64) precluded a direct comparison between internal events. Three Advanced Course students held environmental science degrees indicating that attendance was part of a longer term career progression. Two were self-financing and actively seeking employment in an environmental capacity.

Table 5. Student characteristics

Characteristic: The student is ...	Variation Ratio		
	Advanced course (n = 52 students)	Foundation course (n = 14 students)	Management course (n = 12 students)
Employed	0.04	0.00	0.00
Employed in the private sector	0.06	0.00	0.00
Manager or supervisor	0.84	0.14	0.08
Environmental manager and/or technical specialist	0.35	0.78	0.92
35 – 55 years old	0.15	0.14	0.00
Male	0.15	0.14	0.33

With one exception, students (n = 78) concurred that attendance would provide a widely recognised vocational qualification. The exception, SC38, was a non-voluntary participant on a Management Course. The underpinning student rationale for course attendance varied between individuals. Core reasons focussed on the need to comply with the employer's requirements and a desire for personal development (Table 6).

Table 6. Underpinning student rationale for course attendance

Reason	Advanced course (n = 52 students)		Foundation Course (n = 14 students)		Management course (n = 12 students)	
	VR[1]	SDI[2]	VR	SDI	VR	SDI
I want to update my skills and knowledge	0.06	0.11	0.00	0.00	0.08	0.17
Environmental issues are becoming more important at work	0.18	0.36	0.14	0.26	0.25	0.44
Improving an organisation's environmental performance makes it more competitive	0.04	0.08	0.14	0.26	0.42	0.59
I am getting increasingly involved in environmental issues at work	0.14	0.30	0.50	0.64	0.58	0.71
I want a new environmentally based career	0.25	0.43	0.50	0.60	1.00	1.00

Notes: 1. VR = Variation Ratio 2. SDI = Simpson's Diversity Index

Teacher-directed and collaborative learning were respectively the least and most preferred modes of learning with most students favouring a deep and not a surface approach (Table 7).

Table 7. Student preferred modes of learning and learning approaches

Element		***Level of agreement***	***Advanced course (n = 52 students)***		***Foundation course (n = 14 students)***		***Management course(n = 12)***	
			VR[2]	***SDI[3]***	***VR***	***SDI***	***VR***	***SDI***
Mode of learning	Collaborative	Quite like me	0.29	0.47	0.14	0.26	0.25	0.44
	Self-directed	Quite like me	0.38	0.54	0.28	0.44	0.42	0.45
	Teacher-directed	Quite like me	0.59	0.67	0.50	0.60	0.33	0.55
Learning Approach	Deep	Very like me	0.33	0.48			0.58	0.79
		Quite like me			0.42	0.58		
	Surface	Not very like me	0.42	0.60	0.42	0.61	0.50	0.62

Notes: *VR = Variation Ratio.* ***3.*** *SDI = Simpson's Diversity Index*

Sponsor expectations

The *de minimis* expectation of sponsors was for students to successfully complete the course and increase his/her vocational environmental skills/knowledge. The primary personal factors underpinning Advanced Course attendance were associated with career development. However, this was generally linked to the sponsor's (potential) environmental burden and/or the opportunities presented by the green economy for new products and services. Figure 3 summarises the range of drivers identified by student sponsors as 'significant' or 'important'. These reflect the primary foci of current environmental legislative developments, *i.e.* the concepts of the polluter pays and producer responsibility, and the associated proliferation in market-based instrument driven legislation. Participating sponsors represented the following sectors: chemical/pharmaceutical manufacture, construction, consultancy, engineering, facilities management, fire and rescue service, food and drinks manufacture, local authorities, logistics/road/rail transport and specialist research.

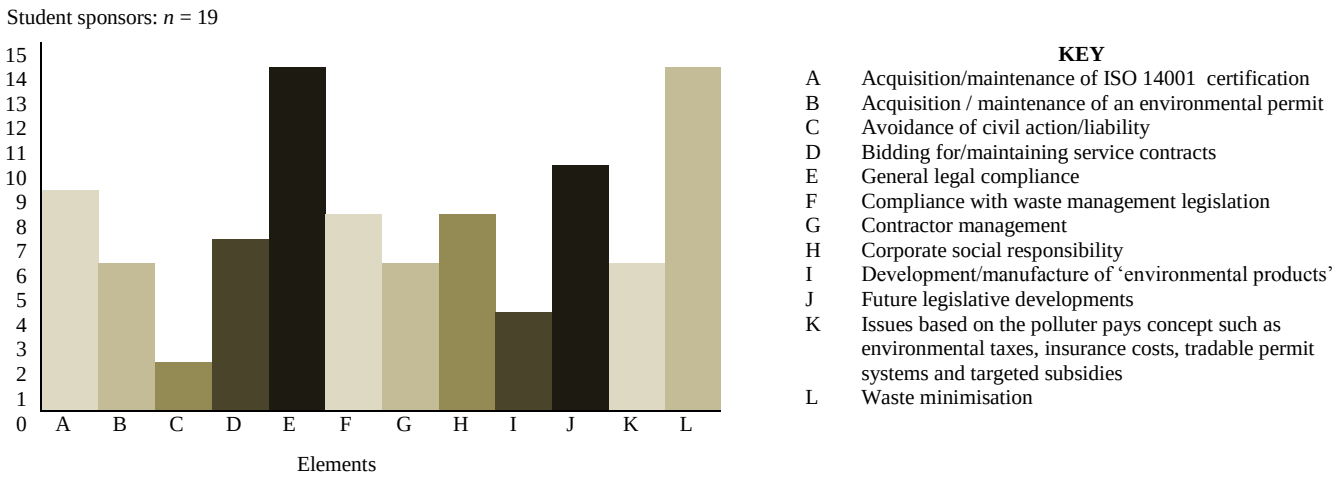


Figure 3. Advanced Course sponsors: Significant and important drivers

Participating Foundation Course sponsors (SP23, SP24 and SP25) were involved in chemical manufacture, construction and specialist research. The need for legislative compliance and an understanding of environmental management systems and associated audits together with wider global issues were cited as core drivers for student sponsorship. The desire for a career in environmental management was identified by six students as a primary or important driver for attendance. The intention to support these aspirations was held by SP24 and SP25 as a reason for sponsorship.

Legislative compliance, waste minimisation and the need to include pertinent environmental factors in broader management decisions were offered as the primary reasons for Management Course sponsorship. Participating sponsors represented the facilities management, logistics and construction industries. Sponsor SP16 (facilities management) anticipated specifically that student SC48 would "*liaise between contractors, clients and the company's environmental specialist".* This was reflected in SC48's assertion that attendance "*would help in my day-to-day job"*. Students concurred that they had been sent on the course to satisfy corporate requirements. Some, notably SC42, considered that attendance would facilitate promotion within the company. Post-course interviews with SP14, the sponsor of student SC38, revealed that this student routinely avoided mandatory training. Although SC38 successfully completed the assessment, post-course interviews indicated that attendance was likely to inhibit future environmental learning due to cognitive dissonance and resentment towards their employer.

Management Course: Return on expectation and learning transfer

The Management Course had a broad, factually based syllabus which focussed on education *about* the environment. The bipartite summative assessment consisted of a closed book classroom-based examination and a post-course workplace assignment (Table 8), each of which carried 50% of the total marks.

Table 8. Management Course assessment

Assessment stage	Focus	Format	Assessment level[1]	Maximum duration[2]
Examination	Repetition of factual knowledge	Compulsory short-answer and multiple choice questions	Unistructural (multiple choice) and multistructural (short answer)	45 minutes
Workplace assignment	Transfer of learning to the workplace	Environmental aspect identification and associated management plan development	Relational	Unspecified

Notes: 1. Based on the SOLO Taxonomy. 2. Undertaken unsupervised in the student's workplace within two weeks of the end of the course.

The predominant examination questions were multiple choice and required a unistructural answer, for which the candidate was awarded a single mark. Multistructural questions were awarded two marks for a fully correct answer. In this type of question, students were typically asked to provide a hierarchical list of related items. A single mark was awarded for each appropriately identified item and a further mark if it was accurately located within the list. The aspects register and associated management plan which formed the workplace assignment were assessed at the relational level. The assignment was one of the nine course elements which students identified as being 'enjoyable' (Figure 4). Two of these items, legislation and waste management, were also held by three students to be particularly useful in their workplace (variation ratio = 0.75).

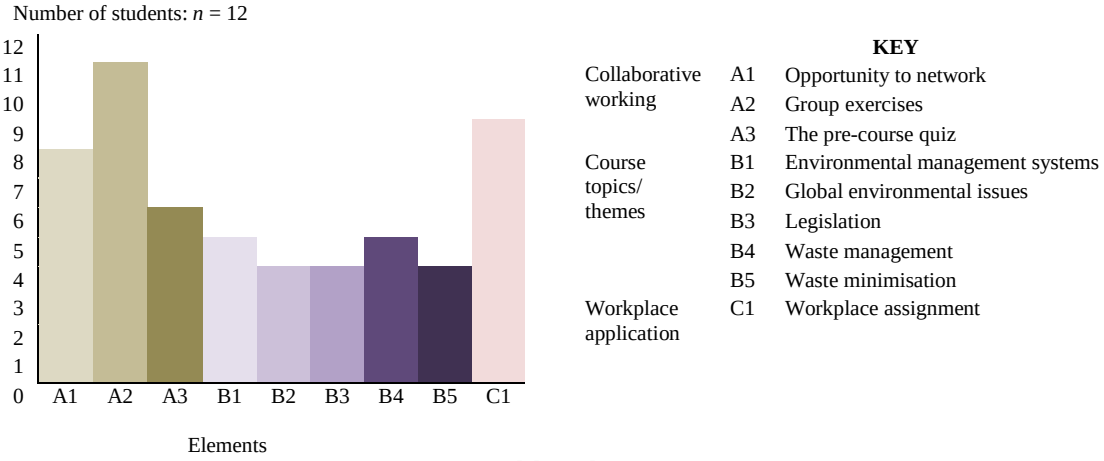


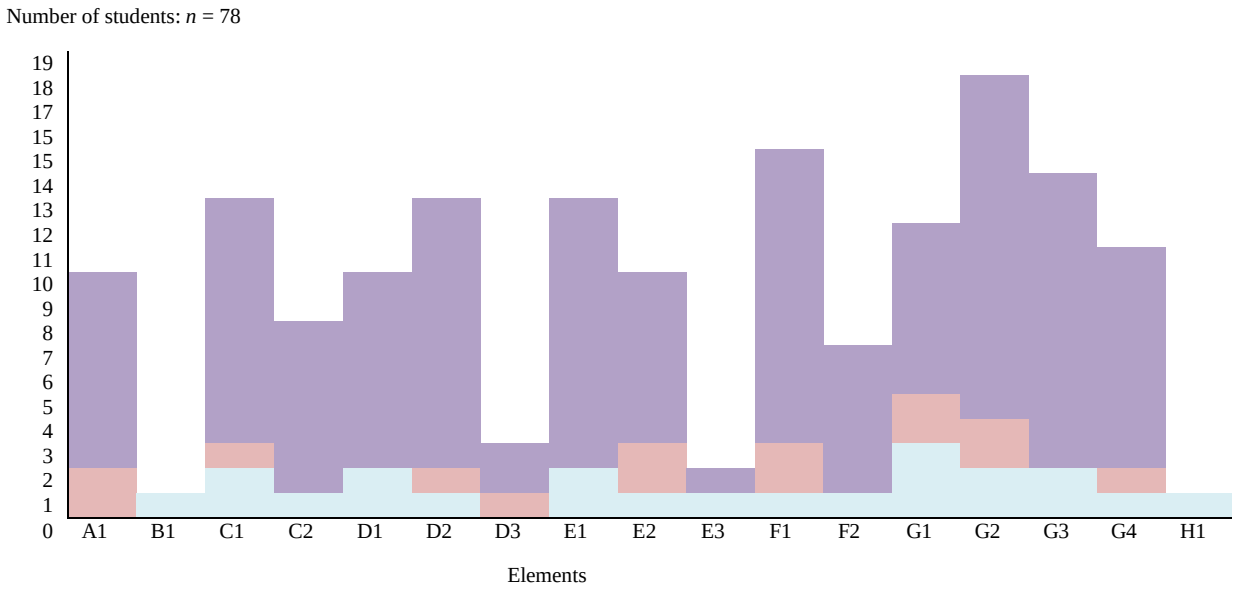
Figure 4. Management Course: 'Enjoyable' elements

There was a corresponding student consensus that the course was paced too fast (variation ratio = 0.17; Simpson's diversity index = 0.32), with insufficient student involvement (variation ratio = 0.17; Simpson's diversity index = 0.30) and a predominance of slide presentations (variation ratio = 0.25; Simpson's diversity index = 0.44). The tutors concurred that they had relied on didactic teaching which focussed on the course examination in response to the:

- Extensive, factually based syllabus.
- Associated volume of course materials.
- Requirement for students to remember and reproduced specific facts in the examination.

Tutors also reported encouraging students to use rote learning to revise for the examination. Teacher-directed learning and student strategies such as rote learning and a focus on learning for assessments are associated with a surface approach to learning (Minbashian et al. 2004; Vermunt and Vermetten 2004). However, as with their counterparts on other courses, Management Course attendees had a general preference for collaborative learning and a deep approach. The 100% pass rate for the course assessment indicates that some students had adopted surface learning strategies in response to the demands of the course assessment. These results support Vermunt and Vermetten's (2004) assertion that friction between the tutor's teaching style and the student's preferred learning style may stimulate the student to successfully use alternative learning styles and strategies.

Successful completion of the course assessment is not synonymous with the transfer of learning to the workplace. The Action Plan was designed to facilitate an understanding of this process. Figure 5 summarises student choices by course type. Items such as the provision of training programmes for employees and/or contractors, and reviews of information provided by suppliers indicated single loop organisational learning. In contrast, activities such as those which targeted ISO 14001 certification and/or environmental permit acquisition were indicative of a double loop approach, *i.e.* the exploitation of new knowledge to evolve new practices, perspectives and operational frameworks.



Key

Management Course **Foundation Course** **Advanced Course**

A	Emergency planning	A1	Review and revise current system
B	Environmental permit	B1	Determine whether an installation requires an environmental permit
C	Environmental Policy	C1	Develop an environmental policy
		C2	Review and revise the existing environmental policy
D	ISO 14001 Certification	D1	Discuss certification with senior management and/or undertake a feasibility study
		D2	Undertaken an initial environmental review
		D3	Complete ongoing development of a management system and achieve certification
E	Supply chain management	E1	Review environmental information provided by suppliers
		E2	Undertake an environmentally focused audit of contractor activities
		E3	Develop an 'approved supplier register/procedure
F	Training	F1	Develop an environmental training programme for all employees
		F2	Include environmental issues in contractor inductions
G	Waste management	G1	Undertake an on-site (*i.e.* internal) waste management audit
		G2	Undertake an external waste management audit (*i.e.* of waste disposal companies)
		G3	Implement/update a waste management /minimisation system
		G4	Identify drains and/or interceptors on site
H	Pest control	H1	Audit the use of weedkillers and other pesticides on site

Figure 5. Action plan items

Attendees on Management Courses selected a mean number of 1.17 items compared to 1.57 and 2.37 respectively for those on Foundation and Advanced Courses where all attendees selected one of more items. In contrast, eight (n = 12) Management Course students failed to select any items due to underpinning apathy associated with the course's limited vocational content. However, those four students who had selected items had started to implement and, in some cases, completed items from their action plans within three months of course completion.

Two Management Course students, SC42 and SC48 stated categorically that they would not recommend this course to colleagues. SC48 identified that:

- *"I've passed the course ... but haven't learnt anything that I didn't know before".*

Sponsors SP15 and SP16 revealed that they would not send further students on this course, although they would continue to use Connaught as a training course provider, *i.e.*:

- *"We've sent people on this course before with disappointing feedback ... we get really positive feedback from other courses ... I'm going to have a look at the new* [Foundation] *four-day course next week"* (SP15).
- *"I would be prepared to think about other courses in the future, but not this one"* (SP16).

Sponsor SP14 confirmed that they would continue to send nominated managers on the Management Course in response to a specific corporate policy. Following the removal this course from Connaught's portfolio, SP14 continued to send students on health & safety courses but not environmental ones**.**

Foundation Course: Return on expectation and learning transfer
The Foundation Course syllabus was application based and focussed on education *for* the environment and, more specifically, education for sustainable development. As with Advanced Courses, the examination board emphasised constructivism and an associated deep approach to learning.

The bipartite assessment utilised the Management Course workplace assignment and a distinct 45 minute open book examination which respectively carried 50% of the total marks. The examination also utilised a combination of multiple choice and short answer questions. In contrast to Management Course examinations:

- Questions focussed on the application of knowledge in the workplace.
- The proportion of multiple choice questions was reduced from 50% to 33%.
- Short answer questions required an answer at a relational level (SOLO Taxonomy) to gain full marks.

Each multiple choice question was again worth one mark. Answers to short answer questions could be awarded up to two marks per item.

As with the Management Course, there was a 100% pass rate among research participants. The opportunity for collective learning and networking were also specifically identified as 'enjoyable' aspects of the course (Figure 6). Three students (SC66, SC67 and SC72) stated that attendance on the course had given them the confidence to subsequently undertake the Advanced Course, echoing the examination board's intended inter-relationship between these courses.

Number of students: $n = 14$

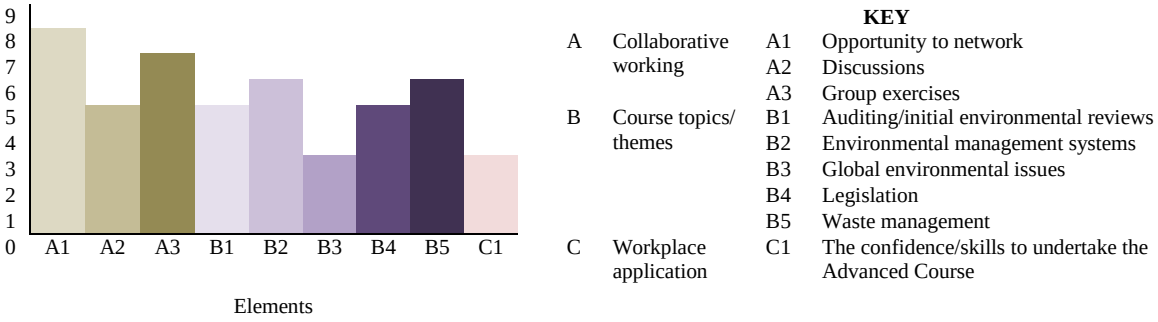


Figure 6. Foundation Course: 'Enjoyable' elements

Collaborative learning was identified as 'enjoyable' (Figure 9) and an opportunity to facilitate the transfer of learning to the workplace, *i.e.*:

- "*Listening to other people made me realise it wasn't just my company that didn't do things right*" (SC74).
- "*I learnt a lot from other people. Some of it was 'what to do' and some 'what not to do' but it was all good*" (SC77).

It was, however, also identified as a source of dissonance for a student (SC71) with significantly more experience than their counterparts echoing previous work by Janssen et al. (2010):

- "*It depended which group I was put in for the exercises, sometimes it felt like I was doing all the work. It was OK but I didn't learn as much ... as I expected*".

In direct contrast to the Management Course, Foundation students generally held that the level of student involvement was 'just right' (variation ratio = 0.28; Simpson's diversity index = 0.44) as was the pace of the course (variation ratio = 0.08; Simpson's diversity index = 0.17). A single student, SC65, held that the course was too broad, *i.e.*:

- "[I]*t's a good course but there's a lot to take in on too many subjects ... I felt rushed*"

The change of focus from one of education *about* the environment on Management Courses to education *for* the environment is reflected in the increased use of the Action Plan (Figure 8) and perceived utility of topics/themes within the Foundation Course (Figure 7).

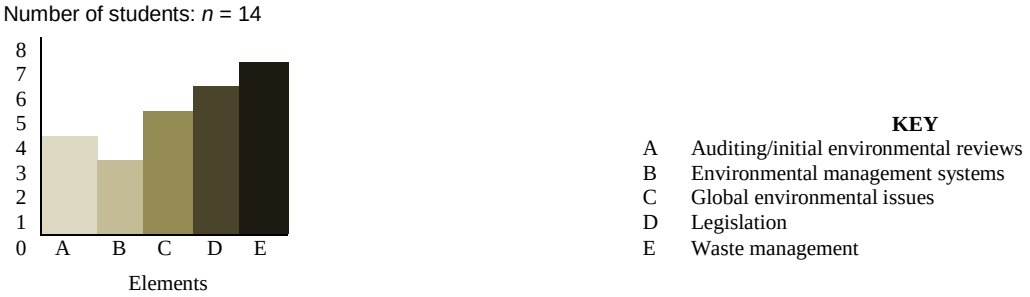


Figure 7: Foundation Course: Elements with 'significant workplace utility'

With the exception of student SC76, Foundation Course students had either completed or at least started the activities on their Action Plan. Management support was widely viewed as

one of the critical factors influencing this process, as illustrated by the following statement from SC76:

- "*My line manager supported* [my attendance] *... I've been back three months and have not been able to do anything even vaguely environmental. I've ... been told they're looking into it. I'm looking for a different job*".

As SC76's student sponsor did not take part in this research, it was not possible to corroborate their evidence. The three sponsors who did take part confirmed that they would put other students on this course, should the need for further training arise.

Only one student (SC65) expressed reservations in recommending the course to other students as:

- "*I don't think its for beginner. There's a lot to think about and you need to have some experience first*".

Advanced Course: Return on expectation and learning transfer
As with the Foundation Course, there was a general student consensus that the following were 'just right':

- Course pace (Week 1: variation ratio = 41; Simpson's diversity index = 0.42; Week 2: Week 1: variation ratio = 31; Simpson's diversity index = 0.48).
- Level of student involvement (Week 1: variation ratio = 41; Simpson's diversity index = 0.42; Week 2: Week 1: variation ratio = 31; Simpson's diversity index = 0.48.

The syllabus for the Advanced Course is again underpinned by the concept of education for sustainable development as reflected in the perceived workplace utility of the course (Figure 8). Selected items also reflected the examination board's focus on individuals who either are, or intend to become, (primarily) environmental practitioners.

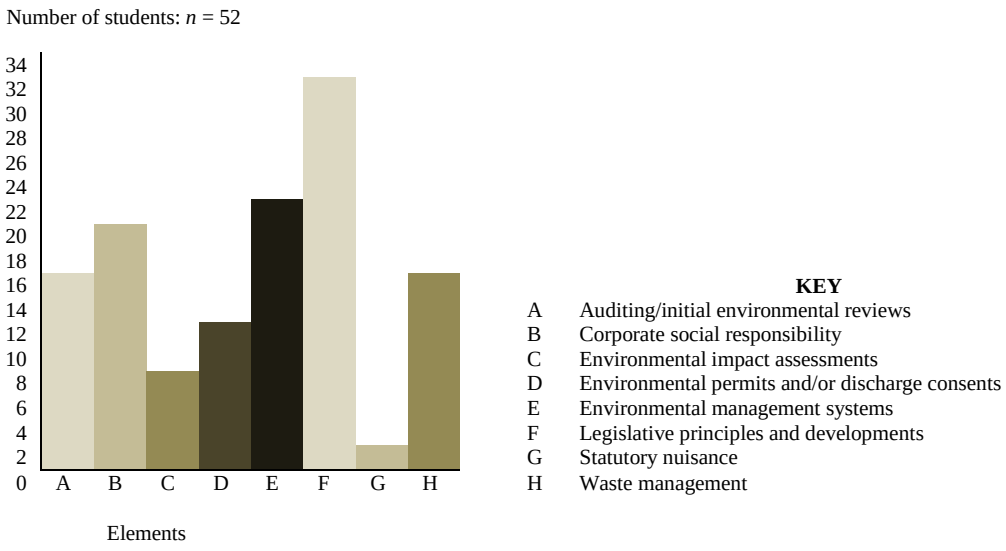


Figure 8: Advanced Course: Elements with 'significant workplace utility'

Items in Figure 8 were introduced during the first week of the course and expanded in the second. The items which were specifically identified by students as 'enjoyable' are

summarised in Figure 9. These reflect the intended target audience, the diverse range of sponsoring organisations and, in items A1 and A2, the importance of collaborative learning.

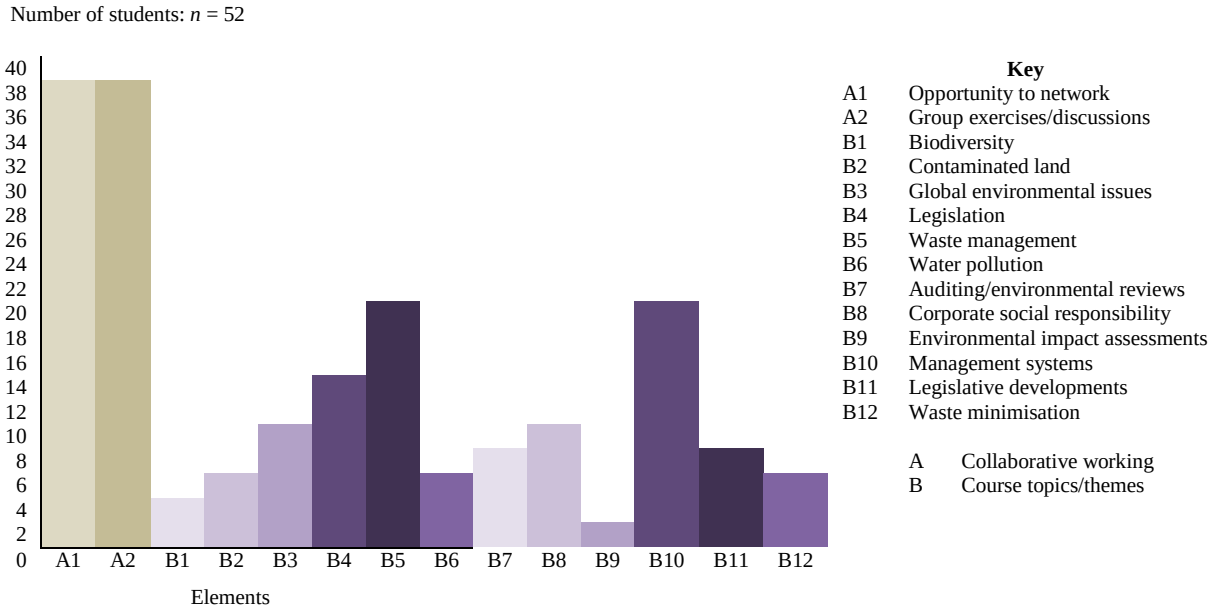


Figure 9. Advanced Course: 'Enjoyable' elements

Positive student feedback with regard to collaborative learning included:

- "*The exercises were good ... I learnt a lot listening to other students*" (SC11).
- "*You learn from the examples other students gave. I also got more confidence in my own answers*" (SC4);
- "*When I did the exam, I remembered* [X the tutor] *told us to use lots of examples ... I used borrowed ones like from the tutor's examples and the other students. I passed as well ...*" (SC31).

The course pass rate was lower than that of the Foundation and Management Courses, *i.e.* 72% and 81% respectively in Phases 1 and 2. Assessments (Table 9) focussed on the student's ability to apply knowledge within a workplace context. The quality of the desired learning outcome was at the fourth level, relational, in the SOLO Taxonomy.

Table 9: Advanced Course: Assessment types

Element	***Phase 1***		***Phase 2***	
Title	Workplace Assignment	Examination	Paper One Examination	Paper Two Examination
Format	Identical to that used for Management and Foundation Courses	Two sections *Section A:* five short, compulsory questions *Section B:* Choice of one of three longer essay style questions	Three compulsory short answer questions	Six compulsory questions *Section A:* One longer essay style question *Section B:* Five short answer questions
Duration[1]	Not applicable[2]	2.5 hours	1.25 hours	2.5 hours
Element pass mark	10/20	50/80	N/A – pass mark set for the whole assessment not for each element	
Course pass mark	60/100.			

Notes: 1. *Examinations were open book but taken under examination conditions in a classroom. "The workplace assignment was undertaken unsupervised in the student's place of work.*

The workplace assignment (Phase 1) was undertaken between the first and second week of the course. Students received feedback at the start of week 2. The summative assessment was

also formative with regard to environmental knowledge/application but did not offer formative examination practice. It was replaced in Phase 2 by a partially formative examination at the end of week 1. The end of course examination was modified to reflect these changes.

The two assessment systems raised different student concerns. Despite having a 100% pass rate, the workplace assignment was viewed more negatively than positively (variation ratio = 0.42; Simpson's diversity index = 0.43). Examples of specific feedback included:

- "*It helped make the first part of the course more relevant* [and] *prepare for week two*" (SC2).
- "*It was a lot of effort for not a lot of marks and I still had the exam to do. The exam terrified me*" (SC17).
- "*It* [the assignment] *was all a lie anyway. I'm not working so I did it on my old workplace with bits fiddled to get a bit of everything from week one in it*" (SC27).
- "*I don't like the exams so the assignment was good ... The trouble was it didn't help with the exam ...*" (SC34).
- "*The project assignment thing was OK but it took a long time to do. I think I'd have preferred more time to revise"* (SC36).

Perceptions of the revised assessment were generally more positive (variation ratio = 0.31; Simpson's diversity index = 0.48) but not always. For example:

- "*I liked the practice exam in week one... The stuff about putting examples with everything in my feedback helped me a lot in the second paper.*" (SC 49).
- "*I didn't do very well in the first exam ... The tutor was great though ... explained where I'd lost marks and helped me to have a go at the second one. I did and I passed*" (SC53).
- "*It was all a bit nerve wracking ...having an exam on the first Friday was terrifying. I worried until the start of week two. But then when I got my mark and feedback, I thought I could do it and I did*" (SC58).
- "*I don't like exams. I knew the course had an exam but then it turned out to be two. Whatever, you tell me, its two exams and I failed both ... I didn't get much chance to revise what with work and everything. I might have managed it for one exam but not two*" (SC59).

Students who failed the examinations in both phases typically exhibited two or more of the following errors:

- Poor time management.
- Failure to respond to the specific question set by the examiner.
- Provision of predominately:
    - Unistructural and/or multistructural responses.
    - Relational responses which are too short, *i.e.* of the correct quality but insufficient quality of information.

Two unemployed students (SC3 and SC27) were solely responsible for their course choice. Nineteen sponsored students stated they had been (primarily) responsible for their enrolment. This behaviour is indicative of self-directed learning which has been shown, *in extremis*, to

encourage less experienced students to make inappropriate learning choices (Ramsden, 2003). Six of the unsuccessful students had very limited previous environmental knowledge and/or recent examination experience as illustrated by the following comments:

- "*I asked to come on the course as it was for people who wanted to become an environmental manager. I didn't realise that I'd have to learn about stuff that wasn't relevant to me ...*" (SC7).
- "*Three people failed on this course. We've already complained. The tutor was OK ... but didn't cover the basics ... assumed we knew more than we did*" (SC20).
- *"I didn't really revise much ... I just ran out of time in the exam. We didn't get enough practice or advice on what to do ...*" (SC21).

Previous research has identified that, as in the last two quotes, students typically take responsibility for their own success but blame the course and/or tutor for their failures (Chapman and Lowes 1984). Anecdotal evidence indicated that some unsuccessful students, such as SC9 and SC35, had adapted their learning style in response to the open-book examination by adopting a surface approach to revision, *i.e.*:

- *"I thought I knew where to find legislation, topics and definitions and I could just look bits up in the exam*" (SC9).
- "*I did revise honest but I spent most of my time putting 'post-its' in so I could find things in the exam. When I got in the exam, I spent too much time looking things up and failed"* (SC35).

These results again echo the outcome of previous studies indicating that the mode of assessment has a significant effect on student approaches to learning (Biggs et al. 2001; Diseth 2007; Minbashian *et al*, 2004).

Poor choice of course was not restricted to students. Five organisations/sponsors (SP2, SP5, SP11, SP19 and SP22) had collectively sponsored six students on the Advanced Course based on their intended learning outcomes with minimal consideration of the students level of pre-course knowledge/experience. For example:

- "*All new members of the EHS Department need to pass* [the course] *as soon as possible*" (SP2 – construction industry).
- "*We were told during our last ISO 14001 that we needed to have an environmental manager with this qualification ...* [X] *volunteered. Do you think he'll pass the resit*?" (SP8 – facilities management talking about student SC13).

Support and encouragement from a supervisor/manager and home/family was considered to be more important to course success by Advanced Course students than other students (Table 10). Anecdotal evidence indicated that the former was associated with the:

- Length of time the student was away from the workplace.
- Increased emotional commitment required for a QCF Level 3 equivalent course.

Home/family support was linked to the perception that successful course attendance would have a positive impact on the individual's career. Courses were also not necessarily held close to the student's home necessitating staying in a hotel for the duration of the course.

Paradoxically, some students chose to stay away from home and family to help them to focus on the course.

Table 10: External student support: Student perspective

Element Specific support and encouragement is important to course success	***Level of agreement***	***Advanced course (n = 50/52 students)[1]***		***Foundation course (n = 14 students)***		***Management course(n = 12)***	
		VR[2]	***SDI[3]***	***VR***	***SDI***	***VR***	***SDI***
From a supervisor/ manager [1]	Agree	0.25	0.43	0.50	0.64	0.58	0.71
From home/family[2]	Agree	0.36	0.51	0.64	0.76	0.75	0.86

Notes: 1. Two Advanced Course students were unemployed. The number of participants for each item is therefore either 52 (point 1) or 50 (point 2) depending on whether the item pertains to employed students only. 2. VR = Variation Ratio. 3. SDI = Simpson's Diversity Index.

The sponsor's requirement to maintain regular daily contact with the workplace (*i.e.* by email and telephone) was cited by 11 Advanced Course students as source of cognitive overload. Three students (SC6, SC9 and SC20) were also required by their sponsors to attend work each day either prior to or after the course. All three students subsequently failed the course assessment. The sponsor of one of these students (SP5) was one of the two who stated that he/she would not consider putting more employees on the course, should the need for further training arise *i.e.*:

- "*At the moment I don't need to train anyone else but, if I did, I think I'd have to look to a cheaper company, especially after what happened*" (SP5).
- "*Two of our employees have failed twice, so no, I wouldn't recommend it!"* (SP21).

Despite their enthusiasm for the course and success thereon, student SC11 was one of three Advanced Course students who had not started to implement their Action Plans within three months of course completion. Together with SC10 and SC35, they cited lack of workplace support as the primary reason for this. Significantly, SC35 was also unsuccessful in the course assessment. The remaining students had started to implement and, in some cases, completed items from their work-based action plans indicating that behavioural change and learning transfer had commenced. The extent to which behaviour change and learning transfer occurred depended on a diverse range of factors including the task/activity concerned, the student's position within the organisation, organisational culture and policy and the internal support available for the individual and his/her initiative. Items such as the development/expansion of training programmes and proactive monitoring, such as auditing, were widely held by students and sponsors to be 'ongoing' rather than complete, as illustrated by the following observations:

- *"You never stop auditing or doing inspections. There's always something new happening or to improve on site"* (SC1).
- *"With regard to learning transfer, I think the best example I can give is that we've put three people through* [the course] *in the last 12 months. Last week we got our ISO 14001 certification!"* (SP7).

Conclusion and discussion

This research confirms that individual learning on EVET courses does not necessarily lead to the workplace application of skills and knowledge. An organisation's underpinning rationale for student sponsorship varies depending on its (perceived) environmental burden together with additional extrinsic and intrinsic factors, such as stakeholder concerns and corporate requirements. Each student will have his/her own internal and external motivational drivers

for attendance. These may, or may not, concur with those of his/her employer. Personal reasons for attendance include a general interest in the environment, a desire for increased knowledge and/or autonomy/authority at work. *In extremis,* it may include the desire for a new career outside their employer's current organisation.

A personal interest/commitment to learning is consistent with the use of a deep approach to learning. Adoption of this approach was also consistent with a predominance of higher quality learning outcomes, notably the long term retention of knowledge and the fundamental understanding of core concepts, which underpin education *for* the environment. These results thus echo the results of previous non-EVET specific research (Biggs et al. 2001; Gijbels et al. 2005; Vermunt and Vermetten, 2004).

The appropriate focussed use of self-directed, collaborative and traditional teacher-directed modes of learning was found to be effective in engaging students in the learning process. Formal collaborative learning was most pronounced on the Advanced and Foundation Courses due to the relative lower curriculum density and consequential reduced focus on teacher-directed learning.

As in previous research (Northwood et al. 2003; Verbitsky, 1991), well managed collaborative learning was shown to be particularly effective in facilitating deep learning and, ultimately, the transfer of knowledge/skills between organisations. Its use did however, lead to an inhibition of learning when there was a significant imbalance in the students' prior knowledge and experience, echoing previous research by Janssen et al. (2010).

Other critical teaching factors which were found to inhibit individual learning were:

- An excessively large curriculum.
- Course content which was not relevant to the student, his/her career aspirations and/or to his/her workplace.
- A focus on facts and details rather than an understanding of core principles and arguments (*i.e.* surface learning).
- Reliance on teacher-directed learning.
- A focus on education *about* rather than *for* the environment.

Echoing previous research, for example by Biggs et al. (2001), Diseth (2007) and Minbashian et al. (2004), the mode of assessment was shown to have a significant and dominant effect on a student's choice of learning approach and associated learning styles and strategies.

A focus on education *about* the environment and a course content which was not relevant to the student's job and/or workplace were significant factors in the inhibition of learning transfer from the individual to the workplace. Additional factors included organisational culture together with the absence or minimal availability of the following:

- Management support.
- Student autonomy and/or pre-requisite authority.
- Personal (*i.e.* student) commitment.

One of the fundamental concepts underpinning education *for* the environment is that it extends beyond the immediate learning situation and the student's associated reaction and retention of knowledge/skills. The validity of this approach is confirmed by the ongoing

success of the Foundation and Advanced Courses included in this study and comparative decline of the Management Course.

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